

# Math 121 – Gateway Exam Sample Problems

1.  $f(x) = -\frac{2}{3}x^3 + x^2 + 12x + 9$

2.  $f(x) = x^{\frac{7}{3}} - 8x^{\frac{4}{3}} + 56$

3.  $g(t) = t^{\frac{2}{3}} - t^{-\frac{1}{4}} + \pi$

4.  $f(x) = \frac{2}{3}x^{\frac{3}{2}} - (\sqrt[3]{4})x + \frac{2}{x^2}$

5.  $h(r) = 3r^2 + 4r + \frac{1}{r}$

6.  $f(x) = -x^{\frac{3}{4}} + x^{-\frac{3}{4}}$

7.  $f(t) = 2t^3 + 6t - \frac{4}{t^2}$

8.  $f(x) = x^{\frac{5}{4}} - 10x^{\frac{1}{4}} + 1$

9.  $f(x) = \frac{1}{x} + \frac{1}{x^2} + \frac{1}{x^3}$

10.  $p(x) = 16x^3 + \frac{17}{\sqrt{x}} - 10x^{3.1416} + \pi^2$

11.  $f(x) = (x^2 + 2x + 5)(x^3 + 1)$

12.  $h(t) = \sqrt{t}(t^2 + 1)$

13.  $f(x) = x^{-\frac{1}{2}}(1 + x^2 + 3x)$

14.  $h(x) = (x^{\frac{4}{5}} + x^{-\frac{4}{5}})(5x^4 - 10\pi^2)$

15.  $g(x) = (x^3 - 3x^{\frac{1}{3}} + 5)(x^4 + 5x^2 - 2\sqrt{x})$

16.  $f(x) = (x^3 + 3x^2 + 2)(x^5 + 6x^2 - 3x + 5)$

17.  $h(w) = (w^{-\frac{1}{3}} - 3w^6)(4w^2 - 2w + 7)$

18.  $g(y) = (\sqrt{y} - 2)(1 - y^2)$

19.  $F(x) = (3x^2 + (\sqrt{7})x - \pi^2) \left( \frac{x^4}{3} - \frac{x^2}{\sqrt{10}} \right)$

20.  $H(t) = (2t - 1)(4 - 0.5t + \frac{t^{\frac{3}{2}}}{9.6})$

21.  $k(x) = \frac{3x - 2}{x - 1}$

22.

$$f(x) = \frac{x^4 - 3x^2 + 2}{x^2 - 2}$$

23.

$$f(x) = \frac{x^3 - 1}{\sqrt[3]{x}}$$

24.

$$f(x) = \frac{3x}{1 - 2x^2}$$

25.

$$k(x) = \frac{x^3 - 2x + 4}{2x^2 + 1}$$

26.

$$g(t) = \frac{1 + t + t^2}{t - t^3}$$

27.

$$r(u) = \frac{5 + u^2}{1 - u^3}$$

28.

$$g(t) = \frac{t^3 - 3t - 2}{t^2 + 1}$$

29.

$$f(x) = \frac{3x}{\sqrt{x} + 2}$$

30.

$$m(y) = \frac{1 - 4y^2}{6y^2 + 1}$$

31.

$$f(x) = \sqrt[3]{x^4 - 7x}$$

32.

$$u(t) = \frac{1}{\sqrt{t^2 + 2t - 1}}$$

33.

$$f(x) = (x^4 + 2x^2 + 2)^2$$

34.

$$f(x) = (5x^3 + 5x)^9$$

35.

$$f(t) = \frac{1}{\sqrt{3t^2 + 2t + 2}}$$

36.

$$h(s) = (1 + \sqrt{s})^{-\frac{1}{2}}$$

37.

$$f(x) = (x^2 + 1)^{-10}$$

38.

$$f(x) = \sqrt{1 + x^3}$$

39.

$$g(r) = \frac{1}{\sqrt{r^3 + 2r}}$$

40.

$$m(u) = \sqrt{1 + \sqrt{u}}$$

41.

$$f(x) = (1 + (x^2 + 2)^{\frac{1}{2}})^{\frac{1}{3}}$$

42.

$$h(w) = (1 + \sqrt{w^3 + 3})^4$$

43.

$$g(t) = (t^3 - 1)^4(1 + t + t^2)^{-4}$$

44.

$$h(s) = [(s + 2)^3(2 - s)]^3$$

45.

$$f(x) = (1 - 2x)^3(2x^2 - x)^4$$

46.

$$h(s) = \sqrt{\frac{s^2 + s - 2}{s + 2}}$$

47.

$$f(x) = \frac{5 - x}{2(x - 2)^{\frac{5}{2}}}$$

48.

$$f(x) = \left(\frac{x - 3}{x^2 + 7}\right)^4$$

49.

$$g(u) = \frac{2u - 3}{\sqrt{u^2 - 3u + 4}}$$

50.  $F(y) = \left( \frac{1 - 3y}{4 + y - 2y^2} \right)^2$
51.  $f(9x) = (x^2 + 3x)e^x$
52.  $f(x) = \frac{e^{x^2}}{e^{x-1}}$
53.  $f(x) = \frac{e^{-x}}{x}$
54.  $f(x) = x^2 e^{-x}$
55.  $f(x) = e^{-\frac{1}{x^2}}$
56.  $f(x) = 3^{-5x}$
57.  $f(x) = x^2 2^x$
58.  $f(x) = x^4 + 4^x$
59.  $f(x) = 3^{x^2+1}$
60.  $f(x) = \left( \frac{1}{2} \right)^x$
61.  $f(x) = e^{\sqrt{x+x^2+2}}$
62.  $f(x) = \frac{1 + e^{2x}}{2 - e^{2x}}$
63.  $f(x) = e^x \ln x$
64.  $f(x) = \ln(3xe^x)$
65.  $f(x) = \ln \left( \frac{x-1}{x^2+1} \right)$
66.  $f(x) = \ln \left( \frac{e^x}{1+e^x} \right)$
67.  $f(x) = x^2 \ln(2x) + x \ln(3x) + 4 \ln(x)$
68.  $f(x) = \ln \frac{1}{x} - \frac{1}{\ln x}$
69.  $f(x) = x \ln \sqrt{x} + \ln(x^{-2})$
70.  $f(x) = (\ln 7x)^{1/2}$
71.  $w(t) = 17 - \frac{\cos t}{17}$
72.  $g(y) = 2 \sin y - \tan y$
73.  $h(a) = 3 \sin a - 2 \cos a$
74.  $f(y) = \frac{\sin y}{y}$
75.  $m(t) = t \tan t$
76.  $p(u) = \frac{\tan u}{1 - \tan u}$
77.  $g(v) = (\sin v - v \cos v)^{-17}$
78.  $H(x) = \frac{\sin^2 x + \cos x}{x^2 + x}$

79.

$$f(t) = (1 + \sqrt{\sin t})(1 - 2\sqrt{\cos t})$$

80.

$$F(y) = \tan(17 + y)$$

81.

$$h(r) = 4 \cos^7(2 - 4r)$$

82.

$$l(y) = \sin \sqrt{y} + \sqrt{\sin y}$$

83.

$$m(x) = (\cos(1 - x^2))^{3/2}$$

84.

$$F(t) = 4t^3 - \frac{6}{t} + \frac{2}{\sin(3t^2 + 1)}$$

85.

$$h(x) = (x^2 + x - 1)^5 \sin(5x)$$

86.

$$f(s) = \frac{\tan(2s)}{\cos(1 - 2s)}$$

87.

$$h(y) = (\sin y^2)(\sin^2 y)$$

88.

$$K(x) = \left(1 - \frac{\sin(\pi - x)}{\tan(\pi + x)}\right)^{2/3}$$

89.

$$H(x) = \frac{\sin \sqrt{3 - x}}{\sqrt{\tan(4 - x)}}$$

90.

$$l(t) = (1 + (2t + 3 \tan(4t))^{-1/2})^{4/3}$$

91.

$$F(t) = \sin(\tan(\pi t))$$

92.

$$G(x) = \tan(\cos(ex))$$

93.

$$m(b) = \cos(\sin(\sqrt{2}b))$$

94.

$$k(s) = \cos(\pi \sin(1 - s^2))$$

95.

$$g(t) = \sin^2(t^2 + \tan t)$$

96.

$$R(x) = 2 \sin\left(\frac{1}{\cos x}\right)$$

97.

$$M(x) = \sqrt{\tan(\sin(4x))}$$

98.

$$F(y) = 1 + \sqrt{\pi + \cos(\sin(ey))}$$

99.

$$f(x) = \ln(\sin x)$$

100.

$$f(x) = e^{3 \cos(2x)}$$