Answers to Semester I Final Review (ID: 1)

1) $\sqrt[3]{4}$

2) $-\sqrt[3]{7}$

3) $\sqrt{2}$

4) $\sqrt{2}$

5) 6

6) $\frac{1}{2}$

7) 0

8) 1

9) $\frac{1}{2}$

10) $-\frac{25}{9}$

11) Does not exist.

12) Does not exist.

13) 2

14) 3

15) $-\infty$

16) ∞

17) -1

18) $\frac{2\sqrt{3}}{3}$

19) $h'(s) = 4s$

20) $\frac{dg}{dx} = 1$

21) $\frac{df}{dx} = 4x$

22) $f'(s) = -4s + 2$

23) $\frac{dr}{ds} = \frac{3}{2\sqrt{3s+3}}$

24) $h'(x) = \frac{3}{2\sqrt{3x+1}}$

25) $\frac{dy}{dx} = (5x^5 + 2) \cdot -25x^4 + (-5x^5 + 1) \cdot 25x^4$
$= -250x^9 - 25x^4$

26) $f'(x) = (2x^5 + 4) \cdot -6x - 3x^2 \cdot 10x^4$
$= -42x^6 - 24x$

27) $f'(x) = \frac{(3x^2+2)(15x^4+12x^3) - (3x^5+3x^4) \cdot 6x}{(3x^2+2)^2}$
$= \frac{27x^6 + 18x^5 + 30x^4 + 24x^3}{9x^4 + 12x^2 + 4}$

28) $f'(x) = \frac{(5x^4-4) \cdot 20x^3 - 5x^4 \cdot 20x^3}{(5x^4-4)^2}$
$= -\frac{80x^3}{25x^8 - 40x^4 + 16}$

29) $\frac{dh}{ds} = 3((3s^4-1)^5+1)^2 \cdot 5(3s^4-1)^4 \cdot 12s^3$
$= 180s^3((3s^4-1)^5+1)^2 \cdot (3s^4-1)^4$

30) $g'(s) = \frac{1}{3}(3s-5)^{-\frac{2}{3}} \cdot 3$
$= \frac{1}{(3s-5)^{\frac{2}{3}}}$

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

32) $\frac{dg}{ds} = 2(3s^5+1) \cdot 15s^4$
$= 30s^4(3s^5+1)$

33) $y' = -\frac{4x}{y}$

34) $y' = -\frac{5}{6y}$

35) $y' = \frac{y^3 - 12x^2 - y}{x - 3xy^2}$

36) $y' = \frac{-15x^2y^2 + 6x^2}{3 + 10x^3y}$

37) V = volume of sphere r = radius t = time

Equation: $V = \frac{4}{3}\pi r^3$ Given rate: $\frac{dV}{dt} = -36\pi$ Find: $\left.\frac{dr}{dt}\right|_{r=7}$

$\left.\frac{dr}{dt}\right|_{r=7} = \frac{1}{4\pi r^2} \cdot \frac{dV}{dt} = -\frac{9}{49}$ in/s

38) A = area of circle r = radius t = time

Equation: $A = \pi r^2$ Given rate: $\frac{dA}{dt} = \frac{4\pi}{A}$ Find: $\left.\frac{dr}{dt}\right|_{r=4}$

$\left.\frac{dr}{dt}\right|_{r=4} = \frac{1}{2\pi r} \cdot \frac{dA}{dt} = \frac{1}{32\pi}$ ft/s

39) 50 ft (perpendicular to wall) by 100 ft (parallel to wall)

40) 10 ft from the short pole (or 15 ft from the long pole)