Problem Set 20

2. $\dfrac{\ln x}{\ln 10} \approx 0.434 \ln x$

4. $\dfrac{d}{dx} f(x) = \lim\limits_{h \to 0} \dfrac{5(x+h) - 3 - (5x - 3)}{h}$

$= \lim\limits_{h \to 0} \dfrac{5h}{h}$

$= 5$

6. $D_x f(x) = \lim\limits_{h \to 0} \dfrac{-\dfrac{1}{x+h} + \dfrac{1}{x}}{h}$

$= \lim\limits_{h \to 0} \dfrac{\dfrac{-x + x + h}{x(x+h)}}{h}$

$= \lim\limits_{h \to 0} \dfrac{1}{x^2 + xh}$

$= \dfrac{1}{x^2} = x^{-2}$

8. $Y_1 = \sqrt{4 - \dfrac{4}{9}x^2}$

$Y_2 = -Y_1$

10. $f \circ g = \ln(e^x) = x$

12. 12.386

14. 10

16. $(-4, 0) \cup (2, \infty)$

18. $x = \dfrac{\pi}{2}, \dfrac{3\pi}{2}$

20. $[\sec(-x)](\sec x + 1) = (\sec x - 1)(\sec x + 1)$

$= \sec^2 x - 1$

$= \tan^2 x$

22. $\cos 2x = \cos(x + x)$

$= \cos x \cos x - \sin x \sin x$

$= \cos^2 x - \sin^2 x$

$= \cos^2 x - (1 - \cos^2 x)$

$\cos 2x = 2\cos^2 x - 1$

$2\cos^2 x = 1 + \cos 2x$

$\cos^2 x = \dfrac{1}{2} + \dfrac{1}{2}\cos 2x$

$\cos x = \pm\sqrt{\dfrac{1}{2} + \dfrac{1}{2}\cos 2x}$

$\cos \dfrac{x}{2} = \pm\sqrt{\dfrac{1}{2} + \dfrac{1}{2}\cos x}$

24. C